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Abstract

FISSION HEATED THERMIONIC DIODES

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The scope and objects of the United Kingdom Atomic Energy Authority programme on fission heated thermionic converters are described. Two types of inpile rigs were operated in 1962/63, one with a fixed electrical load and one with a variable electrical load. All these rigs (four) had unclad UC-ZrC rods as emitters and their output current was of the order 10-15 amps cm^{-2} of the emitter surface. Post irradiation examination indicates some fuel material was evaporated from the emitter and was deposited on the anode. There are indications that UC evaporates preferentially from the UC-ZrC alloy.

The present development programme is outlined. To obtain a more accurate measure of the efficiency of the diodes future rigs will be placed inside calorimeters. Rigs having refractory metal emitters operating at elevated caesium pressures have been constructed and a rig consisting of four generators in series inside a single envelope has been designed.

Fabrication of UC-ZrC fuel, compatibility tests performed on various materials in caesium and plans for future work on refractory metal-fissile fuel compatibility and ceramic to metal seals are discussed.